

UNITED STATES PATENT OFFICE.

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HYDROCARBON-ENGINE.

SPECIFICATION forming part of Letters Patent No. 432,260, dated July 15, 1890.

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To all whom it may concern:

Be it known that I, GEORGE B. BRAYTON, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in Hydrocarbon-Engines, of which the following is a specification.

This invention relates to that class of engines which derive their power from the expansion produced by the combustion of sprayed or atomized hydrocarbon in the cylinder.

The objects of this invention are to insure an abundant supply of air to support combustion in the cylinder with the least expenditure of power; also, to provide means whereby the liquid fuel is delivered into the combustion-chamber in a finely-divided state most favorable to quick combustion; also, to provide novel means for regulating the speed of the engine by automatically varying the amount of liquid fuel which is fed to the combustion-chamber; also, to construct an incandescent burner which will instantly ignite the combustible mixture which is injected into the combustion-chamber; also, to improve the engine in various other respects, as will be hereinafter more fully described, and pointed out in the claims.

In the accompanying drawings, consisting of four sheets, Figure 1 is a longitudinal sectional elevation of my improved engine. Fig. 2 is a top plan view of the same. Fig. 3 is a fragmentary sectional elevation of the cylinder, combustion-chamber, burner, and valve mechanism, on an enlarged scale. Fig. 4 is a side elevation of the gate whereby access may be had to the interior of the cylinder for lighting the burner. Fig. 5 is a horizontal section in line *x x*, Fig. 3, showing the spraying device on an enlarged scale. Fig. 6 is a vertical section of the burner, on an enlarged scale, in line *y y*, Fig. 3. Fig. 7 is a sectional elevation of the governor which controls the oil-pump, on an enlarged scale. Fig. 8 is a horizontal section of the lower portion of the governor and of the oil-pump. Fig. 9 is a vertical cross-section of the oil-pump in line *w w*, Fig. 7. Fig. 10 is a sectional elevation of the safety-valve whereby an excessive pressure of air is relieved. Fig. 11 is a side elevation of the standard supporting the crank-shaft

and gearing for operating the oil-pump and valves. Fig. 12 is a rear elevation of the same. Fig. 13 is a horizontal section of said standard in line *z z*, Fig. 11. Fig. 14 is a side elevation of the standard with gearing removed. Fig. 15 is a vertical section showing a modified construction of the spray-nozzle. Fig. 16 is a horizontal section of the same, on an enlarged scale, in line *x x*, Fig. 15.

Like letters of reference refer to like parts in the several figures.

A represents a hollow rectangular base, upon the front end of which is mounted a vertical cylinder B, provided with a piston *b*. The cylinder B is provided at its upper end with a jacketed head C, while its lower end is open and communicates with the interior of the hollow base. The upper end of the cylinder B extends about one-half of its diameter above the range of the upward stroke of the piston *b*, thereby forming a compression and combustion chamber B', in which the explosive material is ignited. The piston *b* is of the cup-shaped pattern and provided centrally with an automatic self-opening valve *b'*, which is closed when the piston is forced downwardly by the expansion of the gases in the combustion-chamber, but opens inwardly at every alternate downward stroke of the piston for the admission of air, which is compressed on the upward stroke of the piston, and supplies the necessary oxygen preparatory to another explosion. The valve *b'* consists of a disk, which closes an annular series of openings *b²*, formed in a plate *b³*, which is screwed into the piston-head. This valve is normally held on its seat by a spring *b⁴*, surrounding the valve-stem *b⁵* and bearing with its ends against the plate *b³*, and a collar *b⁶*, attached to the lower end of the valve-stem.

D represents a walking-beam arranged inside of the hollow base and mounted on a rock-shaft *d*. This beam is connected at its front end with the piston *b* by means of a connecting-rod *d'*.

D' represents a crank-shaft journaled in standards *d²* *d³*, secured to the upper rear end of the base. The crank-shaft is provided on one side with a balance-wheel D², and is connected with the rear end of the beam D by a connecting-rod *d⁴*, passing through an opening *d⁵* in the base. This opening also serves